

July 11, 1986

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:

Enclosed are the first in a series of deliverables in the Small Systems Service Program of INPUT's 1986 Customer Service Program, composed of the following:

- A three-ring binder with title page, table of contents, list of exhibits, and tabbed sections I through VII.
- Four individual minicomputer vendor performance analyses. These analyses are shrink-wrapped for protection and three-hole punched to facilitate placement in Section III of the enclosed Small Systems Service Program binder. Also a title page has been included to be filed before the table of contents section.

As research is completed, INPUT will send you additional vendor performance analyses, shrink-wrapped and three-hole punched to be filed in Section III of the Small Systems Service Program binder. Along with each set of analyses, INPUT will include an updated table of contents and list of exhibits.

Later in the year, INPUT will begin delivery of the Small Systems Service Vendor Profiles, which will be filed in Section IV of the binder, and the Small Systems Service Market Analysis, which will be filed in Section V of the binder. Along with the Service Market Analysis, INPUT will include the Executive Overview to be filed in Section II of the binder. Throughout the year, INPUT will send additional appendix information, such as industry totals, definitions, and questionnaires, to be filed in Section VI.

The goal of our new research format is to provide the fastest turnaround of research information to our clients by reducing any delay between research completion and delivery of our findings.

As always, we welcome your questions and comments about our new research format. Please feel free to call me directly at (415) 960-3990.

Sincerely,

Rick Brusuelas
Program Manager, Customer Service Program

RB:ml

Enclosure

F-SSA A-D
Letter
Original





Litton

Mellonics

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Page 1 of 1

DATE 7-2-86
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ANALYSIS OF SMALL ~~SYSTEMS~~ SYSTEMS SERVICE

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III-D-1 → III-D-16	VII-1 → VII-4						

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ANALYSIS OF SMALL SYSTEMS SERVICE

1986



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Customer Service Program

Analysis of Small Systems Service - 1986

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ANALYSIS OF SMALL SYSTEMS SERVICE

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I INTRODUCTION

- This is the first in a series of reports covering the small systems market produced by INPUT for clients of the 1986 Customer Service Program. To minimize elapsed time between research completion and the delivery of the research findings, INPUT has adopted a new format for the 1986 program. Instead of separately bound, cumulative reports on an entire market segment (in this case the small systems market), INPUT will now deliver individual vendor's user analyses and vendor profiles as quickly as the research is completed. These modules will usually be released in groups of three to five analyses, shrink-wrapped and three-hole punched to facilitate placement in three-ring binders. Each service module (large systems, small systems, third-party maintenance, telecommunications, and software support) can be filed in clearly identified sections within each binder as received. As additional analyses are completed and delivered to clients, an updated table of contents will accompany the analyses.
- The first in the series of deliverables are the small systems user requirements/vendor performance analyses. In this section, which is to be filed in Section III of the small systems binder, user service requirements in the areas of hardware maintenance and systems software support are compared to actual vendor performance. Specific services analyzed include documentation, spare parts availability, engineer skill level, consulting, and training. Each analysis provides traditional measures of vendor performance, such as systems availability, response time, and repair time. Lastly, each analysis explores user attitudes toward alternative service delivery, whether that



alternative is third-party maintenance, increased levels of service from the manufacturer in the form of premium services, or even increased levels of participation by the users themselves in the support of their own equipment.

- The small systems module will cover three product categories that are increasingly overlapping. At the upper end are superminicomputers, such as the AT&T 3B, Digital Equipment Corporation's VAX 11/7XX, IBM's System 38, and the Tandem Non-Stop. At the lower end, sophisticated microcomputer systems, such as the IBM PC AT, the DEC Micro VAX II, and the AT&T 6300, are analyzed. And "squeezed" between (at least in an applications sense) are the traditional minicomputer systems, represented in this study by such systems as the DEC PDP 11/70, IBM System 36, and the Hewlett-Packard 3000.
- The next series of deliverables in the small systems module will be the company profiles of leading small systems vendors. The in-depth analyses of these service organizations will provide information on each vendor's hardware maintenance activities, software support services, educational service offerings, and professional service options. In addition, a description of each vendor's involvement in such critical areas as third-party maintenance and telecommunications support will be covered. As always, each profile will provide information on the service organization's structure, both internally and as a part of the company's corporate structure. Finally, each profile will provide an analysis of the future direction expected for that company's service organization.
- Again, to reduce the elapsed time between completion of the research and the delivery of the research findings, these small system vendor profiles will be delivered in groups of three to five modules and will be filed in Section IV of the small systems binder. As with the user series, an updated table of contents will be provided as new segments are released.



- The last deliverable in the small system module will be the Service Market and Forecast, 1986-1991. This report, to be filed in Section V of the small systems binder, will provide both current and future market size forecasts for small systems maintenance and support. Separate components of this market, including hardware maintenance, software support, educational services, and professional services, will be explored. In addition, this report discusses the key service issues of the past year, with an emphasis on their future impact on service. Lastly, this report provides strategic recommendations based on the entire year's research activities.
- Along with the Service Market Analysis and Forecast, 1986-1991, each client will receive copies of the Executive Overview, which will provide a summary of the key findings of the year's research. These summaries are prepared in presentation format, facilitating slide preparation. As a result, these summaries are popular with many service executives as a source of presentation graphics with corresponding text provided. The Executive Overview should be filed in Section II of the large systems binder.
- The binder contains an Appendix section for information that may be sent at various times during the year. Summary exhibits, industry definitions, and questionnaires are examples of appendix information that would be filed in this section.



III A. HEWLETT-PACKARD

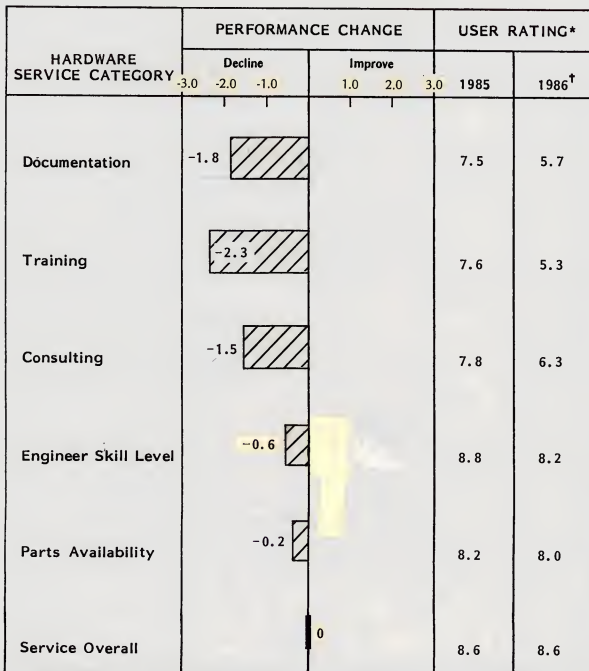
- INPUT interviewed 25 HP 3000 users in the months of April and May 1986, attempting to measure user satisfaction with the hardware and systems software support that they received from HP. All interviews were performed by telephone, each lasting approximately 20 minutes. INPUT targeted data processing managers and computer operations managers as respondents. The sample was evenly distributed geographically and by industry, except for a slight preponderance of process manufacturers (32% of the sample).
- Exhibit III-A-1 suggests that HP user ratings have declined from 1985 to 1986, implying that HP service performance has also declined. While this may be true to a certain extent, it must be emphasized that last year's HP sample reported that HP provided service at levels far exceeding the users' requirement levels. Thus, it is not incongruous that user satisfaction levels with HP support are still quite high, as demonstrated in Exhibit III-A-2. In fact, with the possible exception of hardware FE skill level, HP has correctly identified and satisfied the requirements of their users in all areas without placing too much emphasis on any one area. This is further demonstrated in Exhibit III-A-3, which shows that HP satisfies a majority of their users in all of the components analyzed. While the percentage of users satisfied in particular service areas may have declined from 1985 to 1986, it should be noted that user service requirements in the minicomputer and superminicomputer markets in which HP competes have risen dramatically, and that HP has done well to continue to satisfy the increasing support needs of their users.
- Special mention should be made of the significance of properly identifying the service needs of users. Over the past three years, INPUT has attempted to demonstrate the importance of correctly identifying, measuring, and then satisfying user requirements for both low- and high-priority services in such manner that does not ignore certain unmet needs in some areas while "over-providing" in other areas. Instead, the goal should be to provide the correct



EXHIBIT III-A-1

HARDWARE SERVICE PERFORMANCE, 1985-1986

HEWLETT-PACKARD



* Rating: 1 = Low, 10 = High

† Average Standard Error: 0.3

III-A-2



EXHIBIT III-A-2

1986 USER HARDWARE SERVICE RATINGS

HEWLETT-PACKARD

HARDWARE SERVICE CATEGORY	LEVEL OF SERVICE*		SERVICE EXCEEDS (Falls Below) USER REQUIREMENTS
	Required†	Received†	
Documentation	5.3	5.7	0.4
Training	4.9	5.3	0.4
Consulting	6.1	6.3	0.2
Remote Support	6.5	7.1	0.6
Engineer Skill Level	8.9	8.2	(0.7)
Parts Availability	8.3	8.0	(0.3)
Hardware Service Overall	8.6	8.6	0.0

 User Expectation Exceeds Vendor Performance

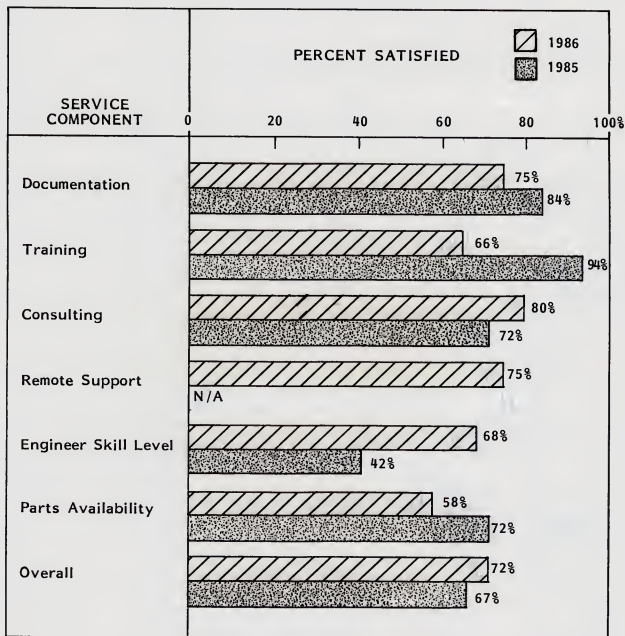
* Rating: 1 = Low, 10 = High

† Average Standard Error: 0.4

III-A-3

Journal of
Business Ethics

EXHIBIT III-A-3

USER SATISFACTION: HARDWARE SERVICE
HEWLETT-PACKARD

III-A-4



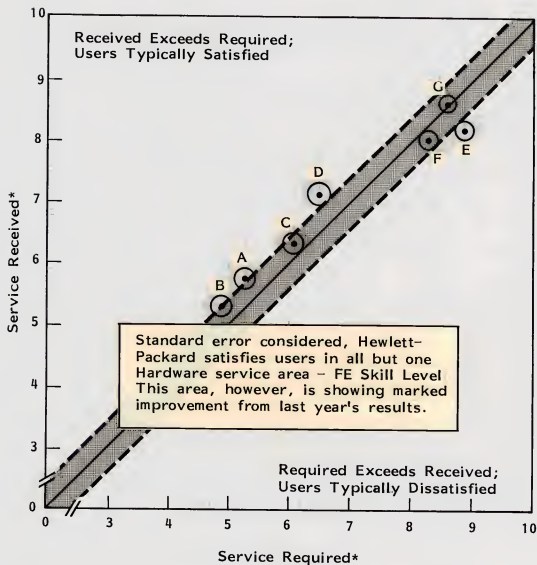
amount of service in all areas. Exhibit III-A-4 shows that HP has successfully met essentially all of their users' needs in the area of hardware maintenance and support without over-emphasizing (and over-spending on) any single service.

- HP has been somewhat less successful in the area of systems software support. Exhibit III-A-5 indicates that HP's users report that systems software support is slipping, particularly in the area of training. While Exhibit III-A-6 suggests that HP meets the average service requirement level for training (taking standard errors into account). Exhibit III-A-7 indicates that the percentage of users who receive a satisfactory level of service dropped from 53% in 1985 to 47% in 1986. A promising sign is the dramatic improvement in the area of documentation, with 41% of the HP sample satisfied versus only 18% in 1985. Exhibit III-A-8 graphically represents HP user satisfaction with systems software support.
- The success that HP has had in satisfying their users' service and support needs, particularly in the hardware areas, has spilled over into user satisfaction as measured by more traditional standards of service performance. Exhibit III-A-9 demonstrates that HP users report exceptionally high system availability actuals, indeed improved over last year's marks, even though the average number of interruptions stayed the same and total turnaround time for problem resolution has increased significantly. In this area, HP benefits from their users' rather low requirements for response and repair times, and since HP successfully exceeds their users' needs in these areas, as indicated in Exhibit III-A-10, user satisfaction with system availability also stays high. HP also benefits from a well-deserved reputation for reliable equipment, which is reflected in the ratings.
- Considering the rapidly increasing service requirements of superminicomputer users, it is surprising that HP users, along with those of Gould, DEC, and Concurrent, to name a few, are not more interested in increasing their own involvement in service. Perhaps this is a result of the increased use of these



EXHIBIT III-A-4

HARDWARE SERVICES REQUIRED/RECEIVED HEWLETT-PACKARD

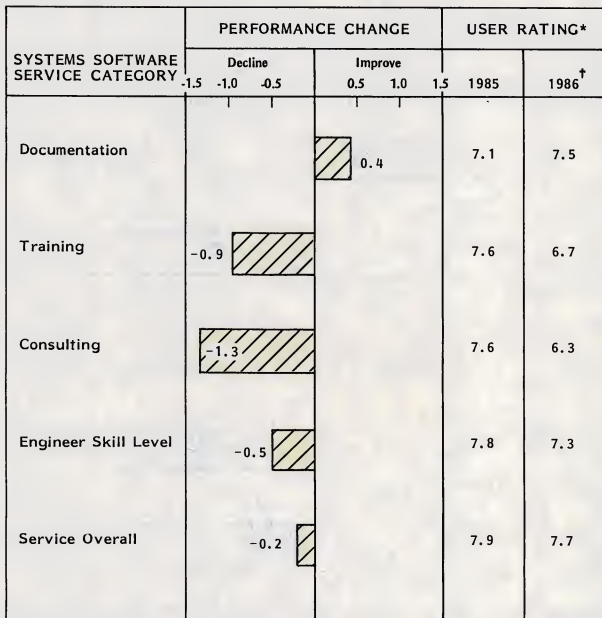


- | | |
|--------------------|------------------------------|
| A = Documentation | E = Engineer Skill Level |
| B = Training | F = Parts Availability |
| C = Consulting | G = Hardware Service Overall |
| D = Remote Support | |

* Rating: 1 = Low, 10 = High



EXHIBIT III-A-5

SYSTEMS SOFTWARE SERVICE PERFORMANCE
HEWLETT-PACKARD

* Rating: 1 = Low, 10 = High


† Average Standard Error: 0.6



EXHIBIT III-A-6

1986 USER SYSTEMS SOFTWARE SERVICE RATINGS
HEWLETT-PACKARD

SYSTEMS SOFTWARE SERVICE CATEGORY	LEVEL OF SERVICE*		SERVICE EXCEEDS (Falls Below) USER REQUIREMENTS
	Required†	Received†	
Documentation	8.6	7.5	(1.1)
Training	6.8	6.7	(0.1)
Consulting	6.1	6.3	0.2
Remote Support	6.6	5.9	(0.7)
Engineer Skill Level	8.1	7.3	(0.8)
Service Overall	8.1	7.7	(0.4)

 User Expectation Exceeds Vendor Performance

* Rating: 1 = Low, 10 = High

† Average Standard Error: 0.3



EXHIBIT III-A-7

USER SATISFACTION: SOFTWARE SERVICE HEWLETT-PACKARD

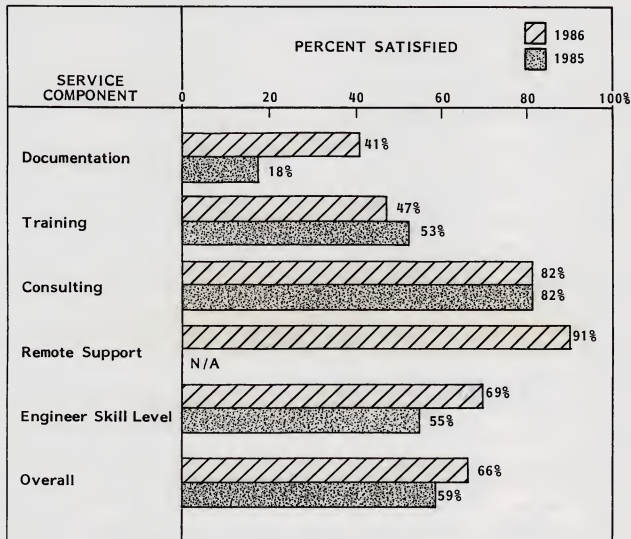
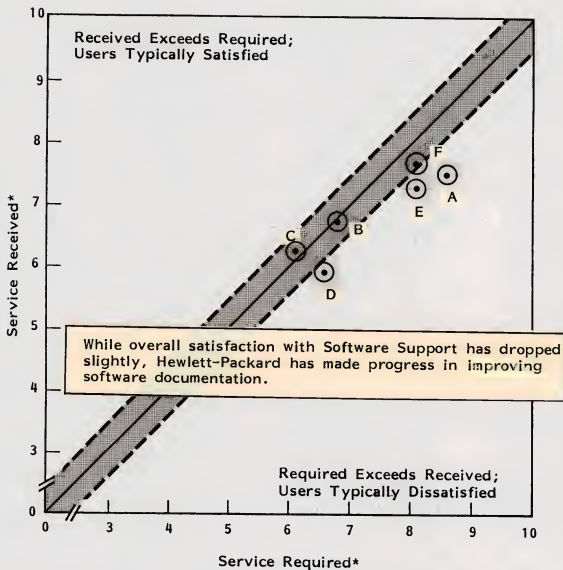




EXHIBIT III-A-8

SYSTEMS SOFTWARE SERVICES REQUIRED/RECEIVED HEWLETT-PACKARD



- A = Documentation
- B = Training
- C = Consulting
- D = Remote Support
- E = Engineer Skill Level
- F = Software Service Overall

* Rating: 1 = Low, 10 = High



EXHIBIT III-A-9

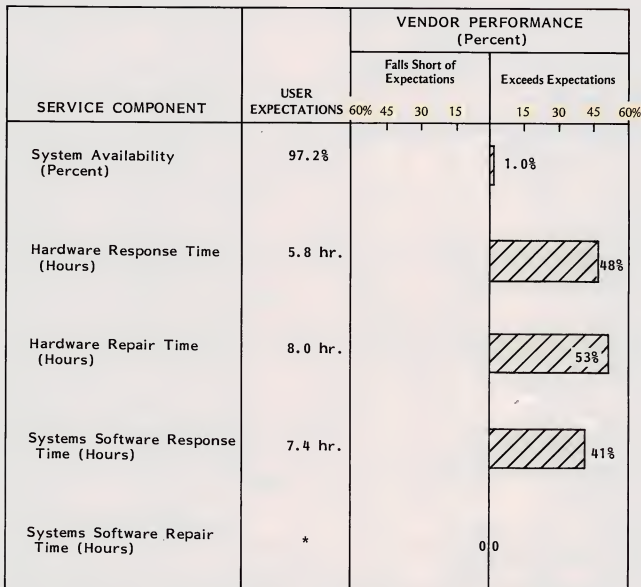
SERVICE PERFORMANCE
HEWLETT-PACKARD

SERVICE COMPONENT	1985	1986
Average System Availability (Percent)	96.8%	98.0%
Average Number of Interruptions		
Per Month (Number)	1.1	1.0
Percent Hardware Caused	75.5%	65.0%
Percent Software Caused	24.4%	26.8%
Average Hardware Response Time (Hours)	4.3 hr.	5.8 hr.
Average Hardware Repair Time (Hours)	3.0 hr.	8.0 hr.
Average Systems Software Response Time (Hours)	3.0 hr.	7.4 hr.
Average Systems Software Repair Time (Hours)	9.4 hr.	*

* Insufficient Response

EXHIBIT III-A-10

USER EXPECTATIONS FOR SERVICE PERFORMANCE
HEWLETT-PACKARD



* Insufficient Response

III-A-12



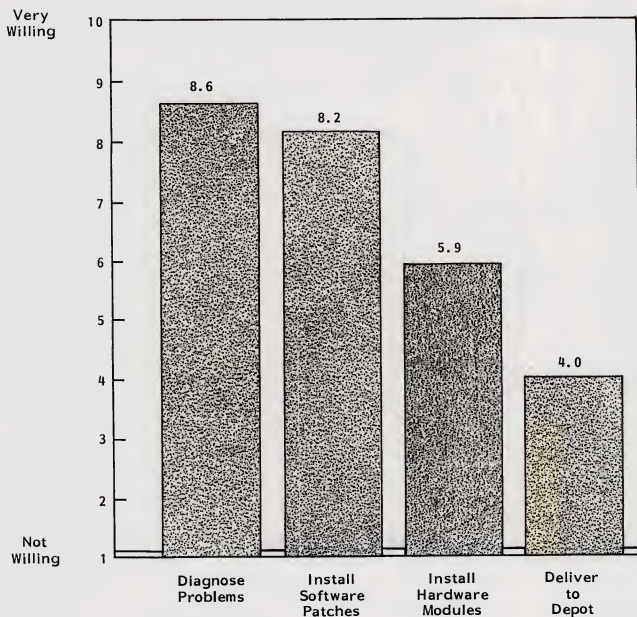
computers by engineering staff, rather than data processing personnel that encourages users to prefer manufacturer-supplied service. Exhibit III-A-11 shows that HP users are relatively interested in phone support; however, they are much less interested than users of large systems who rate their willingness in the 9.0+ range.

- This preference for vendor-supplied service, along with HP's ability to satisfy their users' needs, has also helped limit TPM penetration into HP user sites, even though the large installed base of HP 3000s is an attractive market for TPM. While some TPMs have claimed that HP has gone too far in limiting TPM activity (most notably Datagate of Santa Clara, CA), HP has benefitted from an extremely loyal user base, as demonstrated in Exhibit III-A-12.
- Exhibit III-A-13 presents HP user attitudes toward premium services. As one might suspect, there is rather limited opportunity for additional service offerings at HP since HP offers one of the most extensive service menus in the business. It is apparent that the high system availability requirements of HP's users attract them to services that reduce the need to provide remedial maintenance, services such as remote support and increased preventive maintenance.



EXHIBIT III-A-11

USER WILLINGNESS TO PERFORM MAINTENANCE
HEWLETT-PACKARD



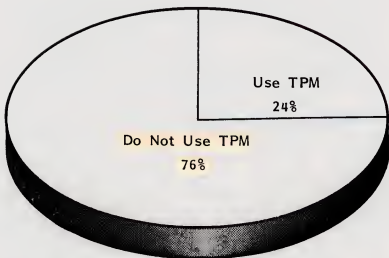
* Average Standard Error: 0.2

III-A-14



EXHIBIT III-A-12

CURRENT TPM USE
HEWLETT-PACKARD



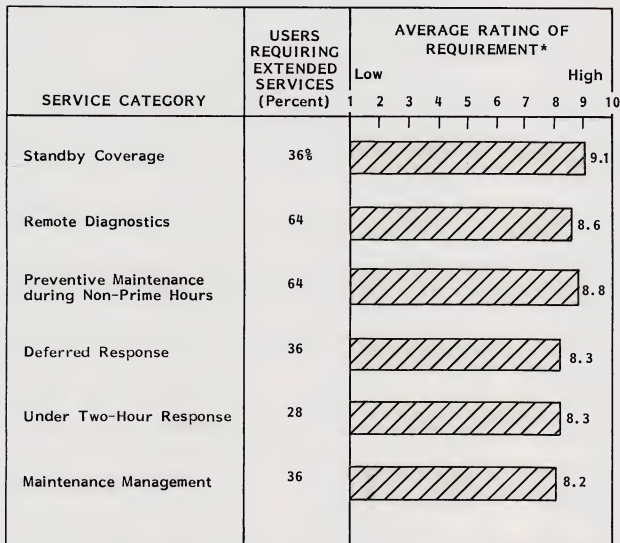
Hewlett-Packard's reputation for quality equipment, coupled with their extensive service menu, provides Hewlett-Packard with a loyal user base.

III-A-15

1. *Journal of the American Medical Association*, 1997; 277: 100-105.

EXHIBIT III-A-13

USER REQUIREMENTS FOR EXTENDED SERVICES
HEWLETT-PACKARD



*Average Standard Error: 0.4



III B. DIGITAL EQUIPMENT CORPORATION

- INPUT interviewed 25 DEC PDP 11/70 users in the months of April and May 1986, attempting to measure DEC's ability to satisfy the hardware maintenance and systems software support needs of their users. All interviews were conducted by telephone, each lasting approximately 20 minutes. INPUT targeted managers of data processing as respondents. The industry breakdown of the DEC minicomputer sample is weighted by business services companies (40% of the DEC sample) and discrete manufacturers (24% of the sample). Other industries represented include education, process manufacturing, and wholesale distribution.
- Exhibit III-B-1 indicates that while DEC's performance in lower priority services improved over the last year, performance in higher priority services, such as FE skill level, spare parts availability, and overall satisfaction, dropped from 1985 to 1986. Not surprisingly, DEC user needs in these areas went unmet in 1986, as shown in Exhibit III-B-2. Most critical of these problem areas appears to be spare parts availability, which satisfies only 24% of the DEC PDP 11/70 sample, as shown in Exhibit III-B-3. What is surprising is the low percentage of DEC users who are satisfied with hardware training, since DEC is well known for their considerable catalog of training courses available to end users. This suggests that few users take advantage of these courses, either due to costs involved or a low perception of the value of additional training.
- Exhibit III-B-4 indicates that DEC users clearly segment hardware services into low priority (documentation, training, and consulting) and high priority (engineer skill level, parts availability, and hardware service overall) groupings. Equally clear is that DEC exceeds the "received" requirement of the low priority group and misses the mark on the high priority group. This does not suggest that DEC should ignore the low priority needs of their users, although a certain redirection of effort is recommended. Rather, DEC needs



EXHIBIT III-B-1

HARDWARE SERVICE PERFORMANCE, 1985-1986
DEC

HARDWARE SERVICE CATEGORY	PERFORMANCE CHANGE						USER RATING*	
	Decline			Improve			1985	1986 [†]
	-2.0	-1.0	-0.5	0.5	1.0	2.0		
Documentation					1.0		6.9	7.9
Training					2.0		4.9	6.8
Consulting				0.3			6.9	7.2
Engineer Skill Level		-0.6					8.2	7.6
Parts Availability		-0.6					7.5	6.9
Service Overall		-0.6					8.4	7.8

* Rating: 1 = Low, 10 = High

† Average Standard Error: 0.5

III-B-2



EXHIBIT III-B-2

1986 USER HARDWARE SERVICE RATINGS
DEC

HARDWARE SERVICE CATEGORY	LEVEL OF SERVICE*		SERVICE EXCEEDS (Falls Below) USER REQUIREMENTS
	Required†	Received†	
Documentation	5.8	7.9	2.1
Training	4.4	6.8	2.4
Consulting	5.4	7.2	1.8
Remote Support	7.2	7.4	0.2
Engineer Skill Level	8.9	7.6	(1.3)
Parts Availability	8.9	6.9	(2.0)
Hardware Service Overall	8.7	7.8	(0.9)

☒ User Expectation Exceeds Vendor Performance

* Rating: 1 = Low, 10 = High

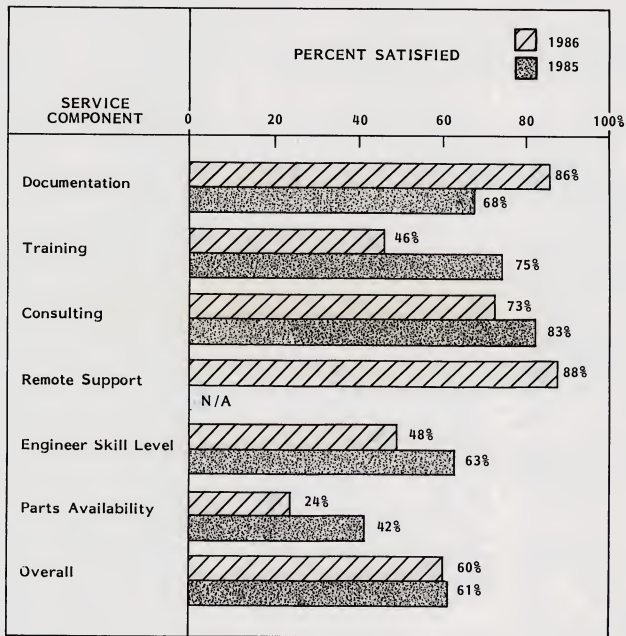
† Average Standard Error: 0.4

III-B-3



EXHIBIT III-B-3

USER SATISFACTION: HARDWARE SERVICE DEC

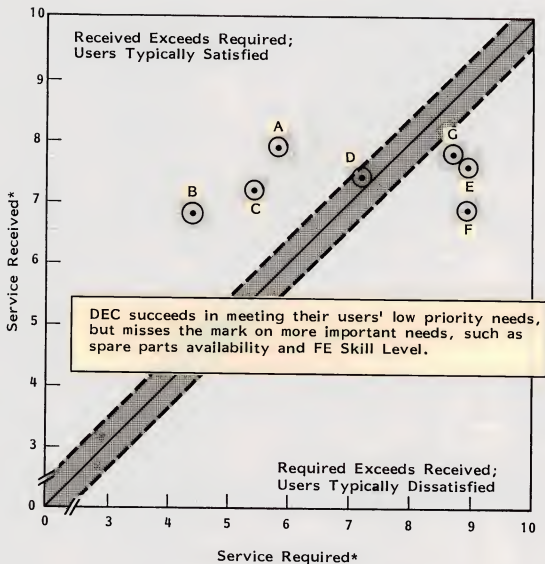


III-B-4



EXHIBIT III-B-4

HARDWARE SERVICES REQUIRED/RECEIVED DEC



- | | |
|--------------------|------------------------------|
| A = Documentation | E = Engineer Skill Level |
| B = Training | F = Parts Availability |
| C = Consulting | G = Hardware Service Overall |
| D = Remote Support | |

* Rating: 1 = Low, 10 = High

III-B-5

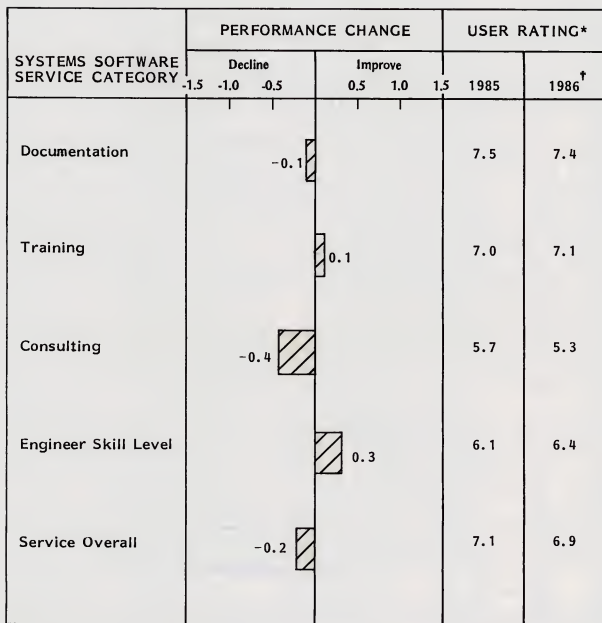


to increase their users' perception of the importance of these services, which will then increase the users' overall satisfaction with service.

- Exhibit III-B-5 indicates that DEC's performance in systems software support is fairly close to that of last year. More importantly, DEC's performance versus their users' requirements, shown in Exhibit III-B-6, needs improvement, as DEC succeeds in meeting user requirements in only one service area-- software training. Moreover, DEC satisfies more than 50% of their users in only this one area, as shown in Exhibit III-B-7. While demonstrating significant improvement in the area of software engineer skill level, DEC fell back in documentation and overall satisfaction with software support. Exhibit III-B-8 graphically demonstrates the gap in software support from DEC.
- DEC performance slipped from 1985 to 1986, as demonstrated by more traditional measurements in Exhibit III-B-9. While system availability stayed about the same, whatever improvement there was in hardware reliability (as measured by the average number of interruptions per month) was offset by slower hardware response and repair times. (Software responsiveness is less important, since the vast majority of system interruptions were hardware related.) Luckily, DEC PDP 11/70 users are very accepting of this, as Exhibit III-B-10 shows these users as having very realistic goals in these areas.
- Exhibit III-B-11 indicates that DEC minicomputer users are relatively attracted to increasing their involvement in the diagnosis of system problems but would prefer that DEC provide the actual repairs. Surprisingly, less than one-fourth of our sample (shown in Exhibit III-B-12) was experienced with third-party maintenance. DEC has been a traditional market for TPM, and one would expect a much larger portion of the sample would have some experience with TPM vendors, given the large number of "foreign" peripherals at DEC sites.
- Exhibit III-B-13 demonstrates the success that DEC has had in presenting a menu of premium services to their users since a much larger percentage of their user sample is attracted to these premium services than most of the other vendors' samples.



EXHIBIT III-B-5

SYSTEMS SOFTWARE SERVICE PERFORMANCE
DEC

* Rating: 1 = Low, 10 = High


† Average Standard Error: 0.4



EXHIBIT III-B-6

1986 USER SYSTEMS SOFTWARE SERVICE RATINGS
DEC

SYSTEMS SOFTWARE SERVICE CATEGORY	LEVEL OF SERVICE*		SERVICE EXCEEDS (Falls Below) USER REQUIREMENTS
	Required†	Received†	
Documentation	8.5	7.4	(1.1)
Training	6.7	7.1	0.4
Consulting	6.1	5.3	(0.8)
Remote Support	8.4	6.8	(1.6)
Engineer Skill Level	8.9	6.4	(2.5)
Service Overall	8.6	6.9	(1.7)

 User Expectation Exceeds Vendor Performance

* Rating: 1 = Low, 10 = High

† Average Standard Error: 0.4



EXHIBIT III-B-7

USER SATISFACTION: SOFTWARE SERVICE DEC

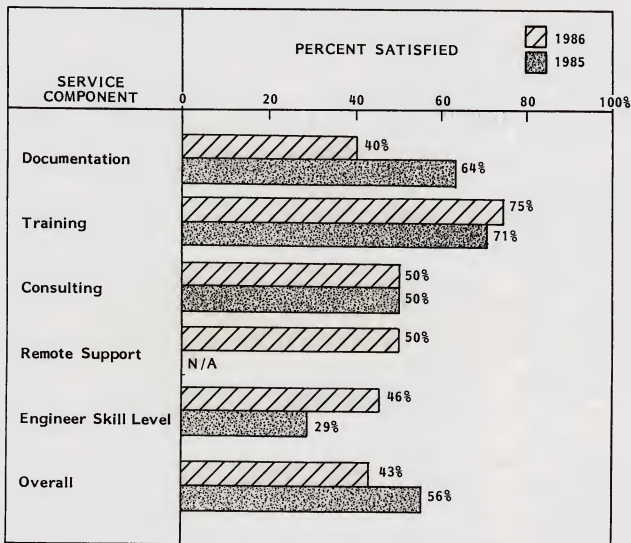
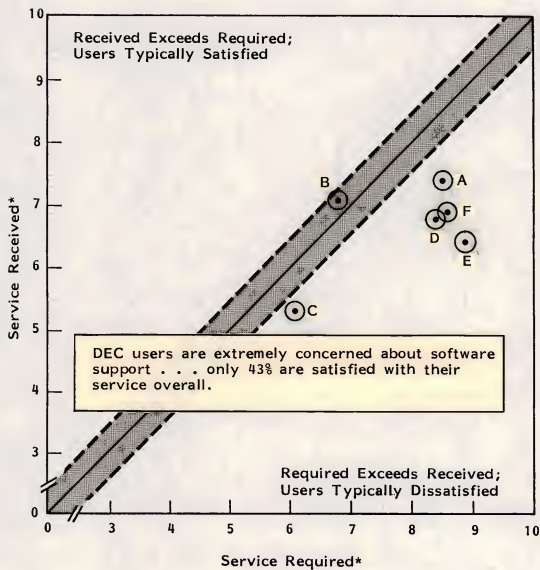




EXHIBIT III-B-8

SYSTEMS SOFTWARE SERVICES REQUIRED/RECEIVED DEC



A = Documentation
B = Training
C = Consulting

D = Remote Support
E = Engineer Skill Level
F = Software Service Overall

* Rating: 1 = Low, 10 = High

III-B-10



EXHIBIT III-B-9

SERVICE PERFORMANCE
DEC

SERVICE COMPONENT	1985	1986
Average System Availability (Percent)	95.7%	95.4%
Average Number of Interruptions		
Per Month (Number)	1.6	1.4
Percent Hardware Caused	82.0%	92.0%
Percent Software Caused	18.0%	8.0%
Average Hardware Response Time (Hours)	2.5 hr.	5.8 hr.
Average Hardware Repair Time (Hours)	3.7 hr.	7.7 hr.
Average Systems Software Response Time (Hours)	4.3 hr.	7.8 hr.
Average Systems Software Repair Time (Hours)	13.4 hr.	6.8 hr.



EXHIBIT III-B-10

USER EXPECTATIONS FOR SERVICE PERFORMANCE
DEC

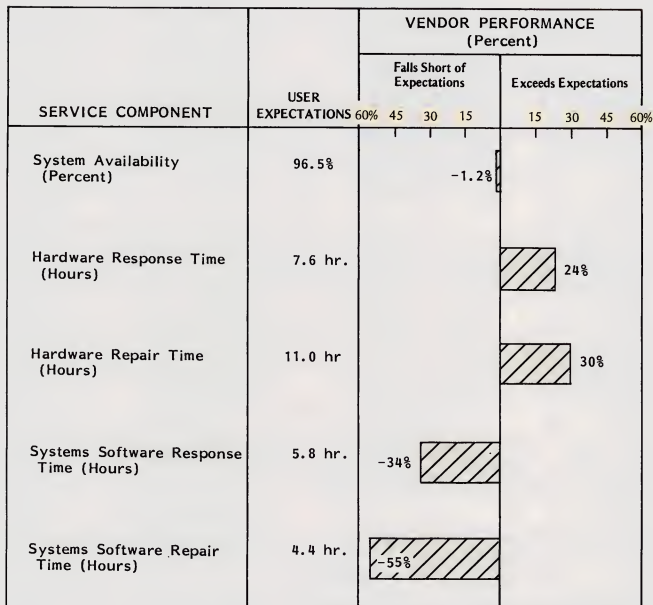
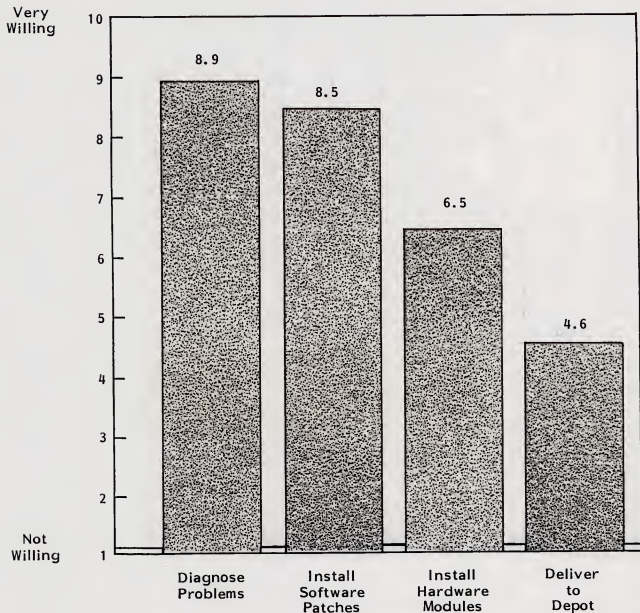




EXHIBIT III-B-11

USER WILLINGNESS TO PERFORM MAINTENANCE

DEC



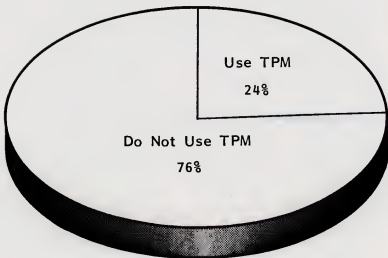
* Average Standard Error: 0.3

III-B-13



EXHIBIT III-B-12

CURRENT TPM USE
DEC

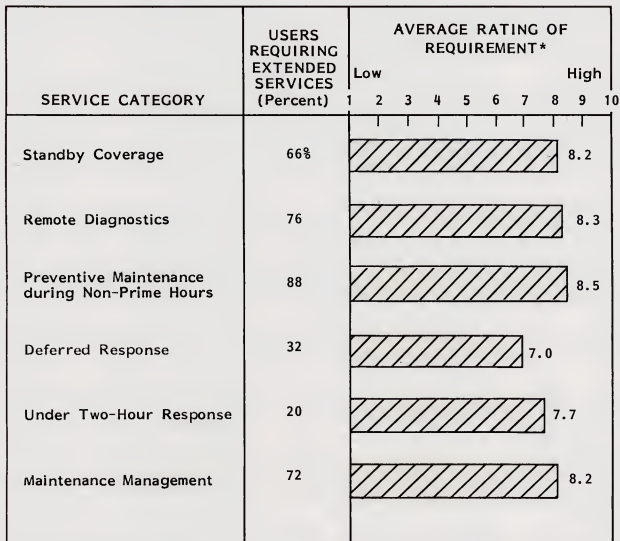


A low percentage of the DEC PDP 11/70 sample is experienced with TPM, surprising since DEC has been a traditional market for TPM.

THE 1993 EAGLE/CHRYSLER AGREEMENT
AND THE FORD/DAEWOO AND FORD/DAEWOO
-DAEWOO AGREEMENTS: A CASE OF

EXHIBIT III-B-13

USER REQUIREMENTS FOR EXTENDED SERVICES DEC



*Average Standard Error: 0.3



III C. INTERNATIONAL BUSINESS MACHINES

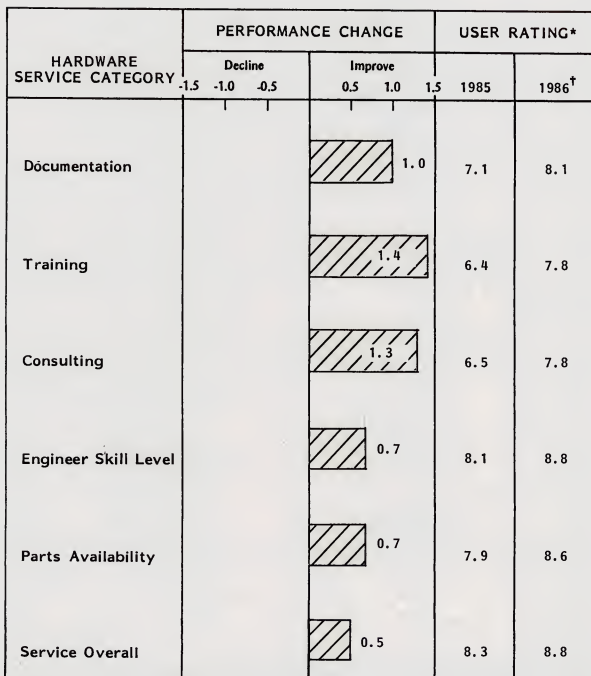
- INPUT interviewed 25 IBM System 36 users in the month of May concerning their satisfaction with the hardware maintenance and software support that they received. All interviews were performed by telephone and each lasted approximately 20 minutes. INPUT targeted data processing and computer operations managers as respondents. While the IBM minicomputer sample was dispersed over a number of industries, the sample was slightly weighted toward services companies (with 24% of the sample), wholesale distribution (20%), process manufacturing (16%), and discrete manufacturing (12%).
- Exhibit III-C-1 indicates that IBM hardware service improved in all areas from 1985 to 1986. The greatest improvement occurred in the areas of documentation, consulting, and training. System 36 users are more segmented in their perception of service than other IBM users, as shown in Exhibit III-C-2, and, as a result, IBM's service performance is less consistent than in the mainframe or superminicomputer markets. For example, while IBM succeeds in satisfying a majority of their users' requirements in every hardware service component analyzed in Exhibit III-C-3, there appears to be a much greater segmentation of the importance and satisfaction of services provided in this user sample. This segmentation is also shown in Exhibit III-C-4, which demonstrates the greater perception of importance that users associate with FE skill level, parts availability, and hardware service overall.
- While Exhibit III-C-5 indicates that IBM's systems software support performance improved in all categories analyzed, System 36 user expectations for service increased at an even faster rate. Exhibit III-C-6 demonstrates that these users have relatively high requirements for most of the service components measured, especially software engineer skill level and software service overall. As a result, System 36 user satisfaction remains low, as shown in Exhibit III-C-7, even lower than 1985 in the key areas of engineer skill level and overall satisfaction. Exhibit III-C-8 graphically demonstrates



EXHIBIT III-C-1

HARDWARE SERVICE PERFORMANCE, 1985-1986

IBM



* Rating: 1 = Low, 10 = High

† Average Standard Error: 0.4

III-C-2



EXHIBIT III-C-2

1986 USER HARDWARE SERVICE RATINGS
IBM

HARDWARE SERVICE CATEGORY	LEVEL OF SERVICE*		SERVICE EXCEEDS (Falls Below) USER REQUIREMENTS
	Required†	Received†	
Documentation	5.8	8.0	2.2
Training	7.2	7.8	0.6
Consulting	6.0	7.8	1.8
Remote Support	5.2	7.6	2.4
Engineer Skill Level	9.0	8.8	{0.2}
Parts Availability	9.6	8.6	{1.0}
Hardware Service Overall	9.5	8.8	{0.7}

☐ User Expectation Exceeds Vendor Performance

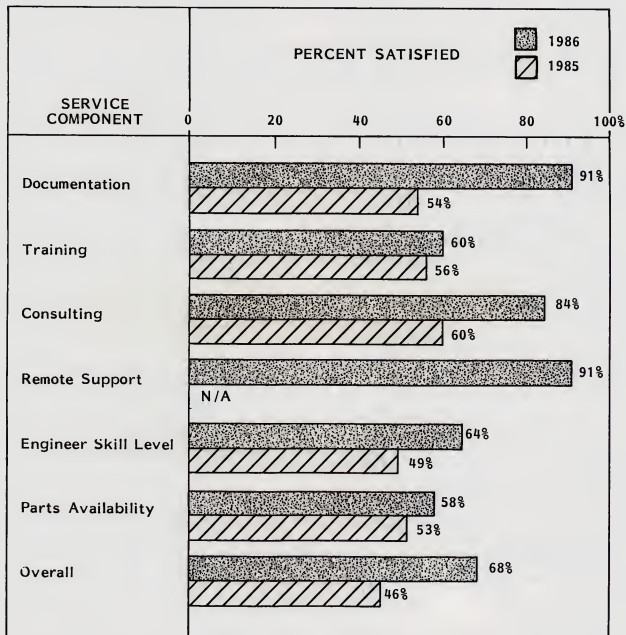
* Rating: 1 = Low, 10 = High

† Average Standard Error: 0.4

III-C-3

EXHIBIT III-C-3

USER SATISFACTION: HARDWARE SERVICE IBM



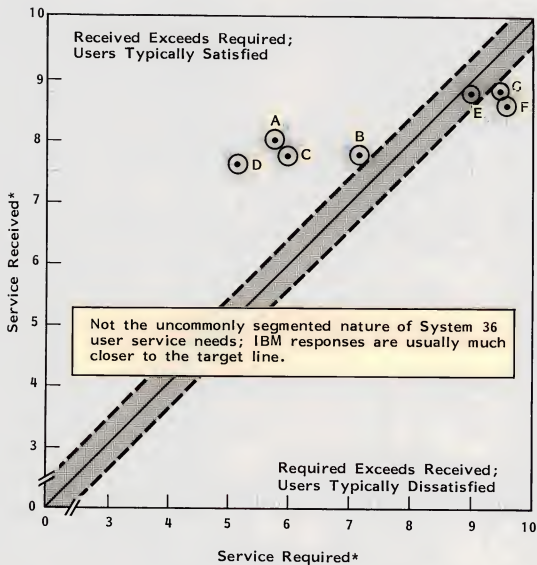
III-C-4



EXHIBIT III-C-4

HARDWARE SERVICES REQUIRED/RECEIVED

IBM



A = Documentation
B = Training
C = Consulting
D = Remote Support

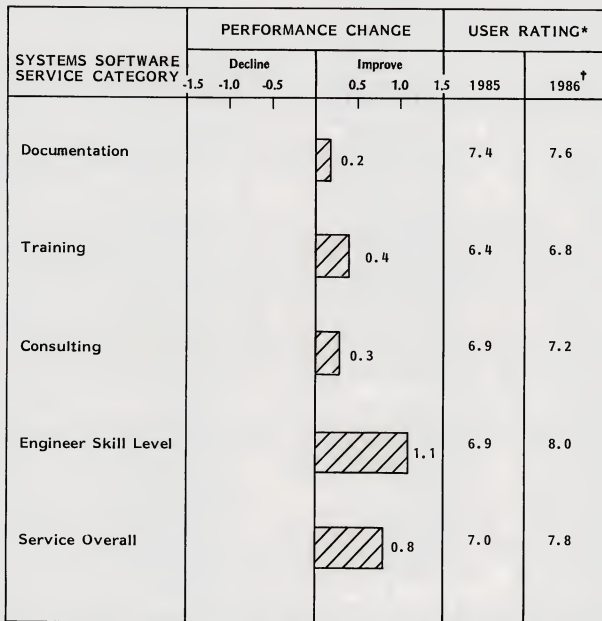
E = Engineer Skill Level
F = Parts Availability
G = Hardware Service Overall

* Rating: 1 = Low, 10 = High

III-C-5



EXHIBIT III-C-5

SYSTEMS SOFTWARE SERVICE PERFORMANCE
IBM

* Rating: 1 = Low, 10 = High


† Average Standard Error: 0.4



EXHIBIT III-C-6

1986 USER SYSTEMS SOFTWARE SERVICE RATINGS
IBM

SYSTEMS SOFTWARE SERVICE CATEGORY	LEVEL OF SERVICE*		SERVICE EXCEEDS (Falls Below) USER REQUIREMENTS
	Required†	Received†	
Documentation	8.3	7.6	(0.7)
Training	8.2	6.8	(1.4)
Consulting	7.9	7.2	(0.7)
Remote Support	5.3	7.5	2.2
Engineer Skill Level	9.0	8.0	(1.0)
Service Overall	9.0	7.8	(1.2)

 User Expectation Exceeds Vendor Performance

* Rating: 1 = Low, 10 = High

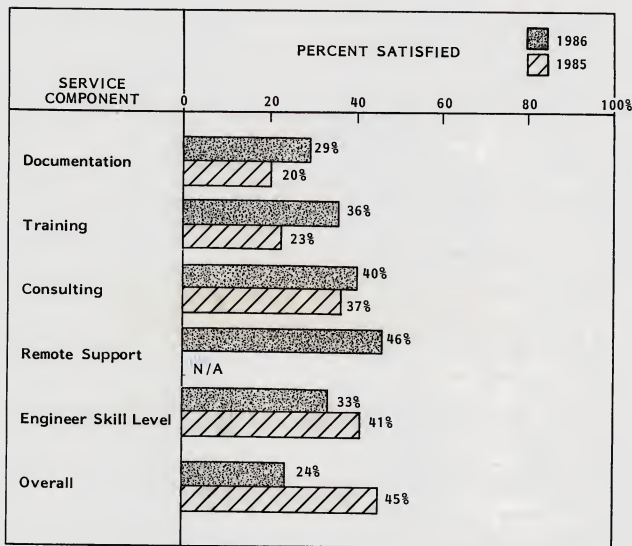
† Average Standard Error: 0.4



EXHIBIT III-C-7

USER SATISFACTION : SOFTWARE SERVICE

IBM

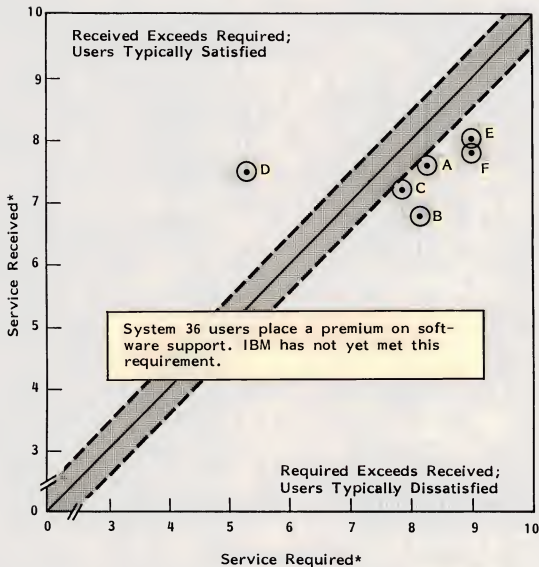


III-C-8



EXHIBIT III-C-8

SYSTEMS SOFTWARE SERVICES REQUIRED/RECEIVED IBM



A = Documentation D = Remote Support
B = Training E = Engineer Skill Level
C = Consulting F = Software Service Overall

* Rating: 1 = Low, 10 = High

III-C-9



the gap between System 36 user requirements for systems software support and their current level of satisfaction.

- User dissatisfaction with IBM service is unusual. Perhaps much of the dissatisfaction is a reflection of user dissatisfaction with the System 36 itself, which has received mixed reviews from users initially attracted to the product as a departmental system (versus competitive products from Wang and HP). Users who upgraded from a System 34 probably were happier with this system, and also the support, due to the closeness of the two systems in design. However, other users have been concerned with the lack of processing "horse power" of the System 36, particularly in departmental processing applications, which undoubtedly has raised the demand on software applications and requirements for software support.
- Exhibit III-C-9 shows the System 36 as an extremely reliable machine, with over 99% system availability and less than one system interruption per month. Hardware responsiveness is faster than the users' requirements, but systems software support responsiveness is lacking, as shown in Exhibit III-C-10. And while user satisfaction with IBM hardware service tends to limit user willingness to perform (hardware-related) self-maintenance, it is interesting, but not surprising, that System 36 users are most willing to become involved in software support, as shown in Exhibit III-C-11.
- Exhibit III-C-12 shows that just under one-quarter of the System 36 sample is experienced with TPM—a high number for such a new product but not for an IBM site. TPM attraction to System 36 is quite high, and TPM penetration into this market can be expected to grow, particularly in distributed applications or those with non-IBM equipment attached. Exhibit III-C-13 hints that there are a number of such locations, given the large number of System 36 users who are attracted to the maintenance management (single-source) concept.



EXHIBIT III-C-9

SERVICE PERFORMANCE
IBM

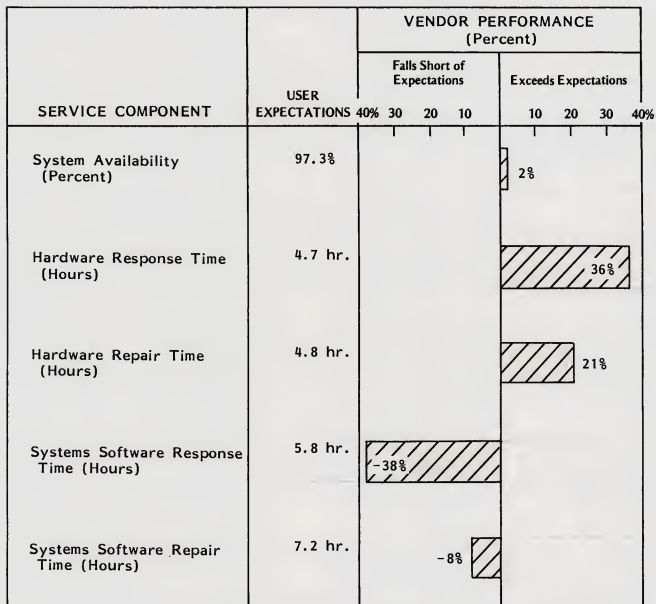
SERVICE COMPONENT	1985	1986
Average System Availability (Percent)	97.2%	99.3%
Average Number of Interruptions		
Per Month (Number)	0.9	0.9
Percent Hardware Caused	65.0%	33.0%
Percent Software Caused	25.0%	24.0%
Average Hardware Response Time (Hours)	2.8 hr.	3.0 hr.
Average Hardware Repair Time (Hours)	3.3 hr.	3.8 hr.
Average Systems Software Response Time (Hours)	9.3 hr.	8.0 hr.
Average Systems Software Repair Time (Hours)	19.5 hr.	7.8 hr.

III-C-11



EXHIBIT III-C-10

USER EXPECTATIONS FOR SERVICE PERFORMANCE
IBM

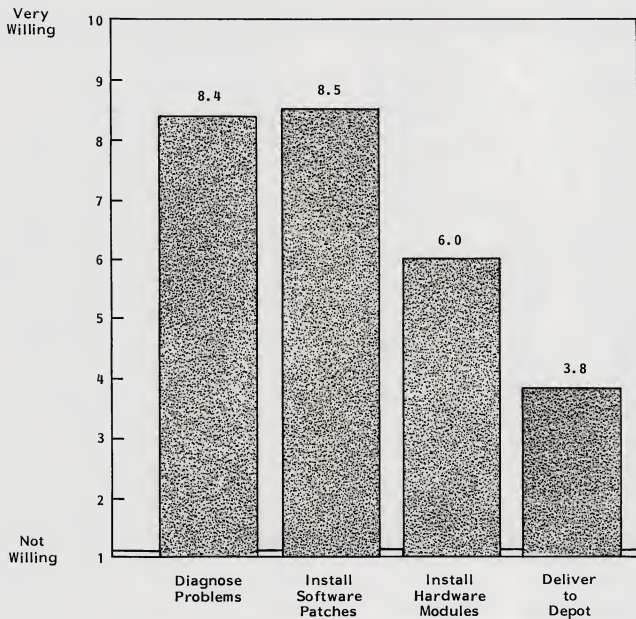


III-C-12



EXHIBIT III-C-11

USER WILLINGNESS TO PERFORM MAINTENANCE
IBM



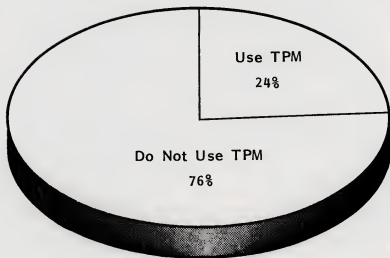
* Average Standard Error: 0.3

III-C-13



EXHIBIT III-C-12

CURRENT TPM USE
IBM



Almost one-quarter of System 36 users are experienced with IBM, a number that will surely rise as the product matures.



Fig. 1 Study area in the northern Adriatic Sea

the study area. The study area was divided into 10 km² grid cells. The grid cells were numbered from 1 to 10. The grid cells were numbered from 1 to 10. The grid cells were numbered from 1 to 10.

The study area was divided into 10 km² grid cells. The grid cells were numbered from 1 to 10. The grid cells were numbered from 1 to 10. The grid cells were numbered from 1 to 10.

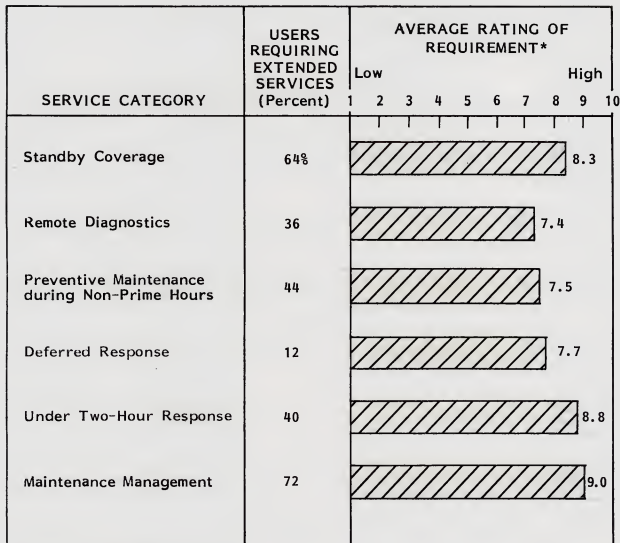
The study area was divided into 10 km² grid cells. The grid cells were numbered from 1 to 10. The grid cells were numbered from 1 to 10. The grid cells were numbered from 1 to 10.

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The study area was divided into 10 km² grid cells. The grid cells were numbered from 1 to 10. The grid cells were numbered from 1 to 10. The grid cells were numbered from 1 to 10.

EXHIBIT III-C-13

USER REQUIREMENTS FOR EXTENDED SERVICES
IBM



*Average Standard Error: 0.3







III D. DATA GENERAL

- INPUT interviewed 25 Data General Eclipse minicomputer users in the months of April and May 1986, attempting to measure Data General's ability to satisfy the hardware maintenance and systems software support requirements of their users. All interviews were conducted by telephone, each lasting approximately 20 minutes. INPUT targeted data processing and computer operations managers as respondents. The industry breakdown of the Eclipse sample was fairly diverse, with 11 of the 14 commonly accepted industry groupings represented.
- Exhibit III-D-1 indicates that the Eclipse sample reported much lower "received" levels of service in 1986, particularly in the areas of hardware documentation, training, and consulting. Exhibit III-D-2 shows that in light of these drops, DG failed to meet their user requirement levels in two of these areas--documentation and training. However, user requirements for these three services are extremely low; hence, DG is able to satisfy a surprisingly large percentage of their users in these areas, as shown in Exhibit III-D-3. Much more important to these users are FE skill level, parts availability, and hardware service overall. In fact, this year's sample of DG Eclipse users were most satisfied with the improvements demonstrated in FE skill level. Even though DG still does not meet their users' requirement level in this area, DG still manages to satisfy 54% of their users, up from 21% in 1985.
- Exhibit III-D-4 graphically demonstrates the dramatic gap in user requirements for these hardware services.
- Exhibit III-D-5 indicates that with the exception of software engineer skill level (which is similar to the hardware engineer rating), DG minicomputer users reported lower "received" levels of service than in 1985. Curiously, these users also gave the widest range of responses in the area of systems software support, as indicated by the large average standard error of the



EXHIBIT III-D-1

HARDWARE SERVICE PERFORMANCE, 1985-1986
DATA GENERAL

HARDWARE SERVICE CATEGORY	PERFORMANCE CHANGE						USER RATING*	
	Decline			Improve			1985	1986 [†]
	-6.0	-4.0	-2.0	2.0	4.0	6.0		
Documentation			-3.7				7.6	3.9
Training			-4.3				7.1	2.8
Consulting			-4.1				7.6	3.5
Engineer Skill Level			-1.3				8.3	7.0
Parts Availability			-0.4				7.8	7.4
Service Overall			-0.1				8.0	7.9

* Rating: 1 = Low, 10 = High

† Average Standard Error: 0.5

III-D-2



EXHIBIT III-D-2

1986 USER HARDWARE SERVICE RATINGS
DATA GENERAL

HARDWARE SERVICE CATEGORY	LEVEL OF SERVICE*		SERVICE EXCEEDS (Falls Below) USER REQUIREMENTS
	Required†	Received†	
Documentation	4.7	3.9	(0.8)
Training	3.7	2.8	(0.9)
Consulting	3.4	3.5	0.1
Remote Support	2.1	2.0	(0.1)
Engineer Skill Level	8.0	7.0	(1.0)
Parts Availability	9.1	7.4	(1.7)
Hardware Service Overall	8.9	7.9	(1.0)

☐ User Expectation Exceeds Vendor Performance

* Rating: 1 = Low, 10 = High

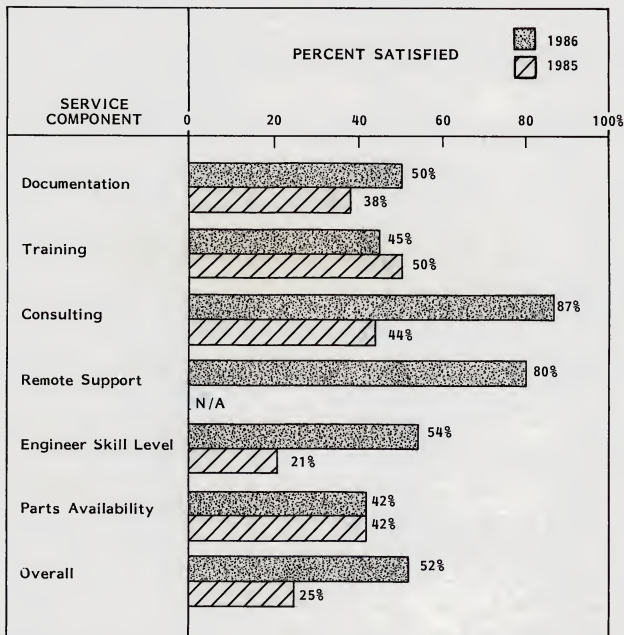
† Average Standard Error: 0.5

III-D-3



EXHIBIT III-D-3

USER SATISFACTION: HARDWARE SERVICE DATA GENERAL

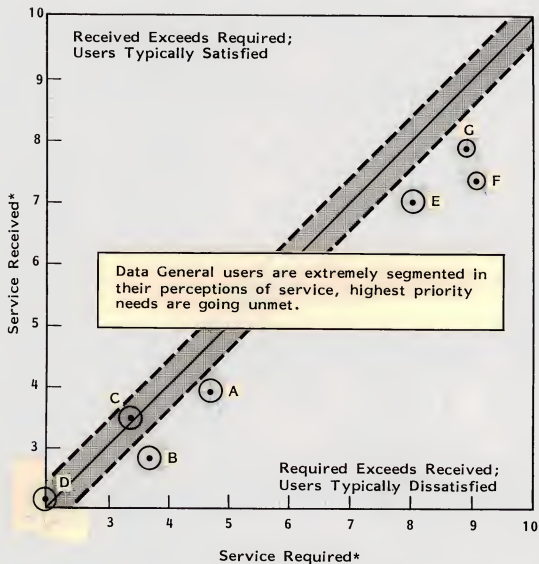


III-D-4



EXHIBIT III-D-4

HARDWARE SERVICES REQUIRED/RECEIVED DATA GENERAL



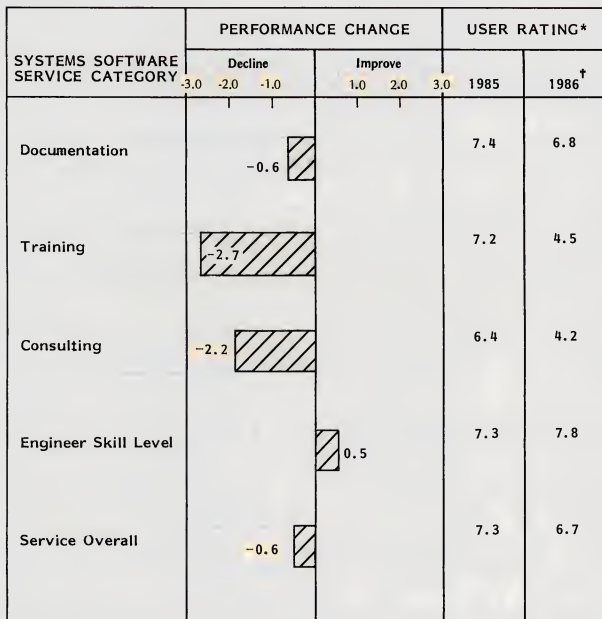
- | | |
|--------------------|------------------------------|
| A = Documentation | E = Engineer Skill Level |
| B = Training | F = Parts Availability |
| C = Consulting | G = Hardware Service Overall |
| D = Remote Support | |

* Rating: 1 = Low, 10 = High

III-D-5



EXHIBIT III-D-5

SYSTEMS SOFTWARE SERVICE PERFORMANCE
DATA GENERAL

* Rating: 1 = Low, 10 = High

† Average Standard Error: 0.6



mean (shown in Exhibit III-D-6), suggesting that DG support in this area is very inconsistent. This is further supported by Exhibit III-D-7, which indicates that even though the mean "received" ratings are below the users' "requirements" (shown also in Exhibit III-D-8), a large number of users are still satisfied with their software support. This suggests that there are a small number of DG Eclipse users who are extremely unhappy with their software support, affecting the mean ratings to a degree disproportionate to actual numbers.


- Exhibit III-D-9 indicates that the Eclipse's system availability slipped from just under 95% in 1985 to approximately 91% in 1986. Both hardware response and repair times were the principal causes; hardware repair time was more than double that of last year's response and 40% slower than the Eclipse users' requirement, as shown in Exhibit III-D-10. Spare parts accessibility appears to be a major part of the problem.
- In Data General's defense, the vast majority of the Eclipse respondents were users of the older "S" series (e.g., S120 and S140 Eclipse) and not the newer technology C/30 Eclipse. Still, the fact that these users are experiencing reliability and responsiveness problems will make it difficult to convince these users to upgrade to newer systems.
- Surprisingly, Data General users are not highly motivated to increase their own involvement in maintenance, as shown in Exhibit III-D-11, even when such activities would cut down on system downtime. Also surprising is the low percentage of users experienced with third-party maintenance, as shown in Exhibit III-D-12, especially considering the advancing years of some of the sample's products.
- Exhibit III-D-13 supports the hypothesis that there are a small but extremely dissatisfied group of Eclipse users (indicated in the discussion about systems software support). While there is no premium service that attracts a large percentage of users, two services--standby coverage and maintenance



EXHIBIT III-D-6

1986 USER SYSTEMS SOFTWARE SERVICE RATINGS
DATA GENERAL

SYSTEMS SOFTWARE SERVICE CATEGORY	LEVEL OF SERVICE*		SERVICE EXCEEDS (Falls Below) USER REQUIREMENTS
	Required†	Received†	
Documentation	8.2	6.8	(1.4)
Training	4.8	4.5	(0.3)
Consulting	4.2	4.2	-
Remote Support	6.0	5.2	(0.8)
Engineer Skill Level	8.2	7.8	(0.4)
Service Overall	6.8	6.7	(0.1)

 User Expectation Exceeds Vendor Performance

* Rating: 1 = Low, 10 = High

† Average Standard Error: 0.8



EXHIBIT III-D-7

USER SATISFACTION : SOFTWARE SERVICE DATA GENERAL

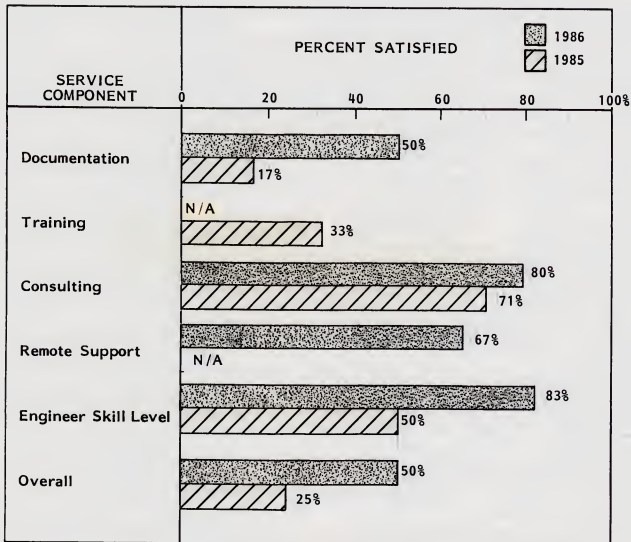
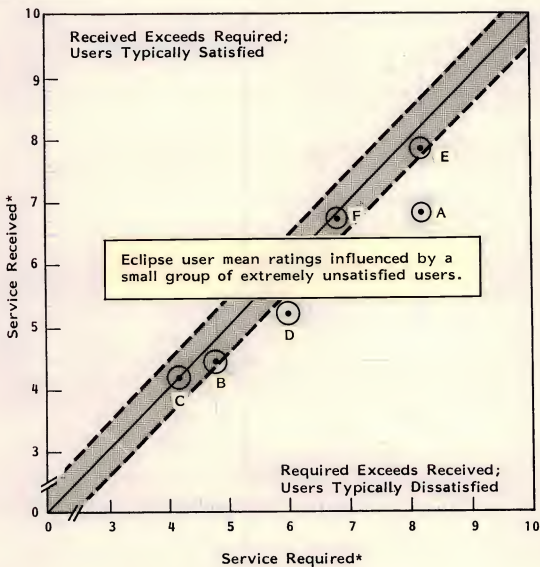




EXHIBIT III-D-8

SYSTEMS SOFTWARE SERVICES REQUIRED/RECEIVED DATA GENERAL



A = Documentation D = Remote Support
B = Training E = Engineer Skill Level
C = Consulting F = Software Service Overall

* Rating: 1 = Low, 10 = High

III-D-10



EXHIBIT III-D-9

SERVICE PERFORMANCE
DATA GENERAL

SERVICE COMPONENT	1985	1986
Average System Availability (Percent)	94.8%	90.8%
Average Number of Interruptions		
Per Month (Number)	2.7	2.1
Percent Hardware Caused	66.0%	56.0%
Percent Software Caused	33.0%	37.0%
Average Hardware Response Time (Hours)	3.6 hr.	4.8 hr.
Average Hardware Repair Time (Hours)	3.5 hr.	8.1 hr.
Average Systems Software Response Time (Hours)	3.1 hr.	3.9 hr.
Average Systems Software Repair Time (Hours)	16.0 hr.	2.8 hr.

III-D-11



EXHIBIT III-D-10

USER EXPECTATIONS FOR SERVICE PERFORMANCE
DATA GENERAL

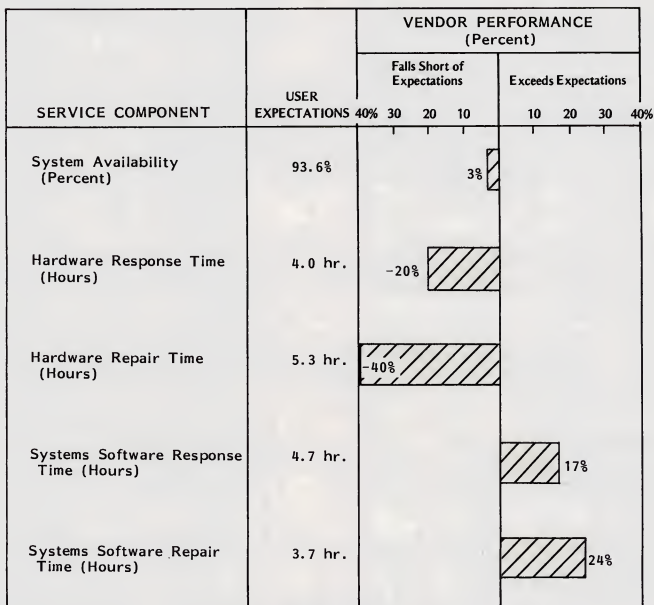
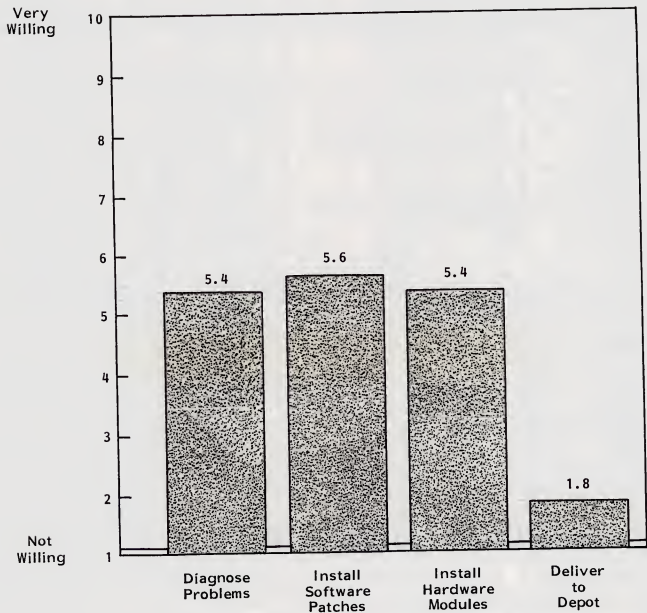




EXHIBIT III-D-11

USER WILLINGNESS TO PERFORM MAINTENANCE
DATA GENERAL



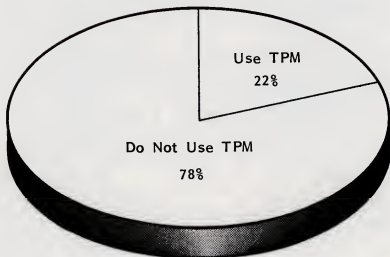
* Average Standard Error: 0.4

III-D-13



EXHIBIT III-D-12

CURRENT TPM USE
DATA GENERAL

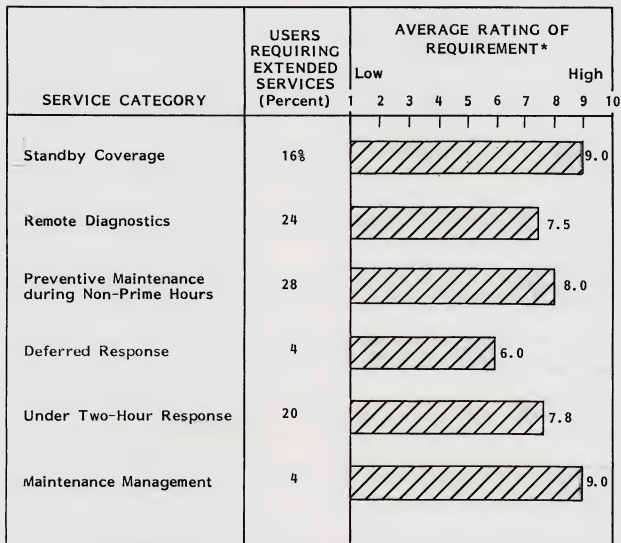


Eclipse user experience with TPM is rather limited considering the age of the product.



EXHIBIT III-D-13

USER REQUIREMENTS FOR EXTENDED SERVICES
DATA GENERAL



*Average Standard Error: 0.3



management contracts—receive very strong ratings of 9.0. However, providing these contract options would require expending a large amount of resources to satisfy a small segment of users, and therefore cannot be recommended.



ABOUT INPUT

Company Profile

Founded in 1974, INPUT has become a leading international planning services firm. Clients include over 200 of the world's largest and most technically advanced companies.

Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions. Continuing services are provided to users and vendors of computers, communications, office systems, and information services. Clients receive reports, presentations, access to data on which analyses are based, and continuous client support.

INPUT is a service company. Through advisory/research subscription services, multiclient studies, and proprietary consulting, INPUT serves clients' on-going planning information needs.

INPUT Planning Services

INPUT offers five continuous information services addressing U.S. markets and two programs covering Western European markets:

- **Market Analysis and Planning Service (MAPS)** provides up-to-date market analyses, five-year forecasts, trend analyses, and sound recommendations for action. MAPS is designed to satisfy planning and marketing requirements of information services vendors.
- **Company Analysis and Monitoring Service (CAMS)** is a comprehensive reference service covering more than 4,000 U.S. information services vendor organizations. CAMS is often used for competitive analysis and pre-screening of acquisition and joint venture candidates.
- **Information Systems Program (ISP)** is designed for executives of large information systems organizations and provides crucial information for planning, procurement, and management decision making. The program examines new service offerings, technological advances, user requirements for systems and services, MIS spending patterns, and more. ISP is widely used by both user and vendor organizations.
- **Customer Service Program (CSP)** provides senior customer service organization management with data and analysis needed for marketing, technical, financial, and organizational planning. The program pinpoints user perceptions of service received, presents vendor-by-vendor service comparisons, and analyzes and forecasts the following markets:



- Large systems service.
 - Small systems service.
 - Telecommunications systems service.
 - Software maintenance.
 - Third-party maintenance.
- **Federal Information Systems and Services Program (FISSP)** presents highly specific information on federal procurement practices, identifies vendor opportunities, and provides guidance from INPUT's experienced Washington professionals to help clients maximize sales effectiveness in the government marketplace.
 - **Western European Customer Service Program** parallels the U.S. Customer Service Program, dealing with comparable issues in European markets.
 - **Western European Software and Services Planning Service (SSPS)** analyzes and forecasts information for European information services markets. Clients receive timely planning information through research-based studies, conferences, client meetings, and continuous client support.

Proprietary Services

The combination of INPUT's planning services and staff expertise provides clients with a uniquely qualified resource for custom research. These proprietary studies take two forms: **multiclient research services**, or in-depth analyses of common issues; and **custom consulting** for a single client. Some of the recent and more frequent topics are:

- Strategy planning and support.
- Product evaluation.
- New market identification.
- Distribution channels.
- Due diligence analysis and support.
- Customer attitude surveys.
- Acquisition research and support.
- Sales and marketing audits.

Clients also benefit from secondary research performed by INPUT for other programs and from INPUT's concentration on the information services industry in general.

Staff Profile

INPUT's professional staff have backgrounds in marketing, planning, information processing, and market research. Educational backgrounds include both technical and business specializations, and many INPUT staff hold advanced degrees.



Many of INPUT's professional staff have held executive positions in the following business sectors:

- | | |
|--------------------|-------------------------|
| • Computer systems | • Processing services |
| • Software | • Professional services |
| • Turnkey systems | • Data processing |
| • Field service | • Network services |
| (customer service) | • Communications |

About INPUT...

- More than 5,000 organizations, worldwide, have charted business directions based on INPUT's research and analysis.
- Many clients invest more than \$50,000 each year to receive INPUT's recommendations and planning information.
- INPUT conducts proprietary research, regularly, for some of the largest companies in the world.
- INPUT has developed and maintains one of the most complete information industry libraries in the world (access is granted to all INPUT clients).
- INPUT clients control an estimated 70% of the total information industry market.
- INPUT analyses and forecasts are founded upon years of practical experience, knowledge of historical industry performance, continual tracking of day-to-day industry events, knowledge of user and vendor plans, and business savvy.
- INPUT analysts accurately predicted the growth of the information services market—at a time when most research organizations deemed it a transient market. INPUT predicted the growth of the microcomputer market in 1980 and accurately forecasted its slowdown in 1984.

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INPUT offers products and services that can improve productivity, and ultimately profit, in your firm. Please give us a call today. Our representatives will be happy to send you further information on our services or to arrange a formal presentation at your offices.

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